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MALACOLOGICAL NOTES—V

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PERUVIAN LAND AND FRESH-WATER SHELLS

1. COASTAL PLAIN NEAR SALINAS, DEPARTMENT OF CHANCAY

Most of the material studied was collected by Colin C. Sanborn, Curator of Mammals at Chicago Natural History Museum, during the Peruvian Zoological Expedition of 1946. The locality is situated in the coastal plain of Peru and is often referred to as the Pampa de Salinas. Some additional material collected near Chancay and in the vicinity of Lima was received from Dr. Wolfgang Weyrauch, of the Estación Experimental Agrícola de Tingo Maria, Peru.

Bulimulus (Scutalus) versicolor callaoensis Pilsbry

Bulimulus (Lissoacme) coagulatus Reeve

Bulimulus (Lissoacme) scalariformis Broderip

A series of specimens of this common shell includes all the variations in shape described by former authors (see Pilsbry, 1895-96, p. 169, pl. 47, figs. 79-81), and proves in addition that the sculpture of closely and regularly set longitudinal riblets, which makes this species look so *Scalaria*-like, may vary widely in extent and strength. Among our specimens there are typically ribbed ones together with entirely smooth ones, and these two extremes, which suggest different species, are connected by a chain of intermediates. These either show no riblets on the earlier whorls, while the last ones are ribbed, or the apical part of the shell is ribbed, while the last whorls are smooth, or the ribs in some parts of the shell are so low that they resemble blunt folds, whereas in others they rise like sharp blades (fig. 30). The coloration of the species also shows a good deal of variability. In our lot are represented all the color variations listed by Pilsbry (1895-96, p. 169): uniform white, whitish with dull brown spiral bands, and dull brown with a darker umbilical crescent and

whitish striae. The uniformly white specimens far outnumber the other color phases.

The specimens of *Bulimulus scalariformis* collected by Dr. Weyrauch in the Lomas de Lachay near Chancay show also all



FIG. 30. *Bulimulus (Lissoacme) scalariformis* Broderip; C.N.H.M. No. 25744. Five specimens showing variability of surface sculpture. $\times 2$.

the intergrades between highly sculptured and almost smooth forms, whereas, as Dr. Weyrauch kindly informs me, those collected in the Lomas de Atocongo near Lima have in general a comparatively low sculpture.

2. PROVINCE OF UCAYALI, DEPARTMENT OF LORETO

The shells listed below came from localities situated in the low land, east of the mountain ranges; in other words, in the tropical jungle. The material was collected by Mr. José Maria Schunke of Pucalpa, Department of Loreto, a collector to whom we owe much of our knowledge of the fauna of the upper valley of the Ucayali.

Pleurodonte (Labyrinthus) baeri diminutus Gude

Yarinacocha near Pucalpa, at about 500 feet elevation.

The specimens were taken alive; they correspond in every respect to the original description.

Leptinaria (Lamellaxis) amomala Pfeiffer

Yanayaca, opposite Pedrera.

The only specimen at hand, though a trifle stouter than the one figured by Pilsbry (1906, pl. 46, fig. 9), seems otherwise to be quite typical.

Subulina (Subulina) yatesi Pfeiffer

Yanayaca, opposite Pedrera.

This species is known only by a description (1855, p. 99) to which our one specimen corresponds so perfectly that I cannot doubt the correctness of classification. It is illustrated for the first time in our figure 31.

Succinea (?) andecola Crawford

Yanayaca, opposite Pedrera.

The single specimen at hand agrees with the original description. The type locality is the basin of Lake Junín, at about 13,000 feet elevation. As the specimen received from Mr. Schunke was collected dead, its empty shell may have been transported from a station much higher in the mountains. Such an assumption would make more probable the identification of a *Succinea* found in the tropical jungle with a species known hitherto only from the Andean region.

Tropicorbis (Lateorbis) canonicus Cousin

Río Ucayali near Yanayaca, opposite Pedrera.

Compared with specimens of *Planorbis canonicus* Cousin in Chicago Museum, received, through Dautzenberg, from Cousin's original lot, the Ucayali shells do not offer any important distinctive features. The reference to the genus *Tropicorbis* is in agreement with F. C. Baker's arrangement of the Planorbidae (1945, p. 85).

Gyraulus (Gyraulus) helophilus d'Orbigny

Río Ucayali near Yanayaca, opposite Pedrera.



FIG. 31. *Subulina (Subulina) yatesi* Pfeiffer; C. N. H. M. No. 25873. $\times 4.5$.

Baker has omitted this species from his work on the family Planorbidae.

Ampullarius (Ampullarius) aulanieri Hupé

Yarinacocha near Pucalpa, in an oxbow lake of the Ucayali River.

The original locality of this species is the Ucayali River, and our specimens agree perfectly with those figured by Hupé. Germain (1910, p. 58, pl. 3, figs. 7-8) records this species from Santa Rosa, Ecuador. These seem to be the only records of *aulanieri* in the entire literature; even monographic treatises, such as Reeve's *Conchologia Iconica*, Kobelt's new edition of the Ampullariidae in the Conchylien Cabinet, and Alderson's *Studies in Ampullaria* do not even mention the name, which is listed without comment by Sowerby (1909, p. 346).

Ampullarius (Ampullarius) haustum immersum, Reeve

Yarinacocha near Pucalpa, in the Ucayali River.

Ampullarius (Limnopomus) columellaris Gould

Río Ucayali at Yanayaca, opposite Pedrera; Baños termales in the Pachitea River near Ganzo Azul, a tributary of the Ucayali River.

Our specimens are a little bit higher than typical *columellaris* and look, therefore, like *A. sprucei* Reeve, another East Andean species of the subgenus *Limnopomus*; *sprucei* has been united with *columellaris* by Sowerby (1909, p. 347).

3. BASIN OF LAKE JUNIN, DEPARTMENT OF LORETO

In recent years the Lake Junín region has been repeatedly the object of zoological investigations and Pilsbry (1926) and Crawford (1939) have reported on its mollusks; but the species thus far recorded constitute only a small fragment of the entire mollusk fauna. For this reason the material collected by Mr. Sanborn during the Peruvian Zoological Expedition of 1946 contained some species never before found in the Lake Junín basin, one of them even new to science.

Temesa incarum Pilsbry

Crawford (1939, p. 322) hints that this species described by Pilsbry (1926, p. 14, pl. 2, fig. 6) from Lake Junín may be only a

local race or subspecies of the much older *Temesa peruviana* Pfeiffer. A study of our lot of *incarum* from Carhuamayo certainly does not refute this assumption, but considering that much richer material from many localities must be studied before the question can be settled definitely, I believe it wiser to use the name *incarum* for



FIG. 32. *Bulimulus (Scutalus) quechuarum* Crawford; C.N.H.M. No. 25878. Five specimens showing range of variation. $\times 1.25$.

our material. Our specimens show a smaller degree of malleation on their last whorls than Pilsbry's specimens apparently had. Furthermore, our lot reveals a good deal of variation in the general shape of the shell and of the aperture in particular. The general measurements of the shell vary from 9.6–12.8 mm. in length and from 3.2–3.7 mm. in diameter; our longest specimen thus is still 1.2 mm. shorter than Pilsbry's type, though 0.2 mm. thicker.

***Bulimulus (Scutalus) alauda* Hupé**

The first record of this species from the Lake Junín region.

***Bulimulus (Peronaeus) hamiltoni* Reeve**

The first record of this species from the Lake Junín region.

Bulimulus (Scutalus) quechuarum Crawford

This species, described by Crawford (1939, p. 330, pl. 19, figs. 11–12) from the Lake Junín region and so far known only from the original locality, is at hand in a rather large series of shells collected both alive and dead, which enables me to add to Crawford's otherwise excellent description some remarks on the range of variation. Figure 32 shows the variability of *B. quechuarum* better than any description; it represents a chain of forms from the type locality in which extremely slender shells are connected with considerably more obese ones. In these specimens the apical whorls are a deep brown or a light horny color, or even dark with lighter streaks, and the interior of the aperture is either lighter or darker orange-brown, or light yellowish in color.

Bulimulus (Scutalus) sanborni sp. nov. Figure 33.

Type from Carhuamayo, basin of Lake Junín, Department of Loreto. Altitude 15,000–18,000 feet. No. 25880 Chicago Natural History Museum. Collected by Colin C. Sanborn between February 28 and March 3, 1946.

Diagnosis.—A small species of *Bulimulus* with the typical apical sculpture of the subgenus *Scutalus*, characterized by a fragile shell of an elongated ovate shape.

Comparisons.—The only other species of *Bulimulus* to which *sanborni* seems to be related are *B. devians* Dohrn from Peru and *B. exornatus* Reeve from Chilon (Bolivia) and from eastern Peru. Both these species are very little known. The first was described without a figure and apparently never recorded subsequently, and the latter was found only once after the original description. Pilsbry (1895–96, pp. 170–171) had not seen any specimens of them when he monographed the Bulimulidae, and since their descriptions did not mention the presence of an apical sculpture, he supposed them to have smooth apical whorls and included them, consequently, in the subgenus *Lissoacme*. The omission of mention that the apices are sculptured does not, in my opinion, warrant the conclusion that the two species mentioned belong to *Lissoacme*; hence their position in this subgenus, as suggested by Pilsbry, can have only a tentative value. Should they prove to have a *Scutalus*-apex, we would have to consider *B. devians* and *B. exornatus* as the closest relatives of *sanborni*, which differs from them mostly by color features and by smaller size. No species of *Scutalus* seems to be more closely related to *Bulimulus sanborni*.

Description of type.—The elongate-ovate shell is very narrowly umbilicate, thin, with $5\frac{1}{2}$ whorls, which are rather flat in the earlier half and rather convex in the last half of the shell. The color is white with grayish brown streaks, in places so wide as to appear as the basic shell color; the apical whorls, however, are uniformly rosy



FIG. 33. *Bulimulus (Scutalus) sanborni* sp. nov. a, C.N.H.M. No. 25880, type; $\times 2.5$. b, c, C.N.H.M. No. 25881, paratypes; $\times 2.5$.

white. The surface of the shell is dull, with crowded rib-like folds standing at unequal distances and extending from suture to suture; these folds are white, while the interstices between them, a little narrower than the folds, are brownish. A fine spiral sculpture of incised lines becomes visible under a hand lens. The oval aperture is almost straight, the outer and basal margins of the peristome are thin and not expanded, and the columellar margin is reflected over the umbilical rim; there is a very fine parietal callus (fig. 33, a).

Measurements of type.—Height 10.9 mm., width 6 mm., height of aperture 5.5 mm., width of aperture 4 mm.

Notes on the paratypes.—No. 25881a–g, Chicago Natural History Museum. Same data as the type.

Two of the paratypes, Nos. 25881a and e, have purplish black apical whorls while in the remaining five they are rosy white in color.

Discussion.—Variation of size, at least in the material at hand, ranges between 10.7 and 12.4 mm. in height, and 5.8 and 6.9 mm. in width; the aperture varies in height from 5.6 to 6.9 mm. and in width from 3.5 to 4.3 mm. There are two color phases in the apical

whorls, a light, rosy white and a dark, purplish black one. The variation of the general shape, as conditioned by the variations of the individual shell measurements, is clearly shown in figure 33, *b*, *c*, which represent respectively the most slender specimen and an almost obese one, the extremes of our set of paratypes No. 25881a-g.

MEASUREMENTS

No.	Height (in mm.)	Width (in mm.)	Height of aperture (in mm.)	Width of aperture (in mm.)
25881a.....	12.3	6.4	5.7	3.9
25881b.....	12.4	6.5	5.7	3.5
25881c.....	11.7	5.8	5.8	3.6
25881d.....	12.1	6.6	6.0	4.0
25881e.....	11.5	6.1	5.6	3.6
25881f.....	10.7	6.3	5.8	3.6
25881g.....	12.8	6.9	5.6	4.3

SUCCINEA PATULA LEACH, AN OVERLOOKED EUROPEAN SHELL

In 1830, Leach described, as new, *Succinea patula* from Nice, France, a species that seems to have escaped the attention of all recorders. Fortunately, the specific name *patula* had twice before been used within the genus *Succinea* (Blainville, 1827, and W. Wood, 1828), so that the name of Leach becomes a homonym and will not have to supersede an older and well established one. Thus, no nomenclatorial changes are involved. It is impossible to identify *S. patula* Leach because of the inadequate description, which is not accompanied by a figure or even a hint as to what other species of *Succinea* might be compared with the supposed new species. It appears best to drop the Leach name completely as unidentifiable.

Leach's *Succinea patula* was published in a paper entitled *Description of some new species of the class Myriapoda*, which explains how the snail names came to be overlooked by compilers of lists of mollusk species. Two snails, two scorpions, three sea-anemones, two leeches, and one sponge were described as new in this paper, all of them found in the neighborhood of Nice, France. Comparison of Leach's species with those of the same animal groups contained in Risso's great publication on the fauna of Nice (1826) shows that many of them bear identical names and even have identical, or nearly identical descriptions. This duplication is certainly not due to a plagiarism by Leach, but probably to the fact that Risso, when beginning his famous work, had entrusted Leach, a then well-known

authority, with the description of certain invertebrates from Nice with which he himself was unfamiliar, and he must have received these descriptions in manuscript from Leach. Only this assumption can explain why Risso (1826, 5, p. 151) published a myriapod as *Callipus rissonius* (Leach), doubtless the identical species described by Leach in 1830 (p. 162) as *Euopus rissonianus* sp. nov.; the two descriptions are almost literally identical. Both Risso and Leach describe, furthermore, a *Succinea elegans* with almost identical words; but in all these cases Risso's names of 1826 have, of course, priority over the Leach ones of 1830. In addition to his *S. elegans*, Risso describes (4, p. 59) a *Succinea grandis*, which could be the *patula* of Leach; the diagnoses of the two species in question do not make such an interpretation impossible, but the descriptions of the coloring and of the soft parts do not sufficiently support such an assumption. Thus it is wiser to consider *Succinea patula* Leach as an unidentifiable species.

There remains a degree of uncertainty as to why Leach published, in 1830, a list of invertebrates from Nice, since most of them had already been included in Risso's work of 1826. Whether Leach did not learn of the publication of Risso's work, or whether the publication of his new species had been unduly delayed till 1830, or whether a break had taken place between the French author and Leach, who was noted for his eccentricity and irascibility, we shall probably never learn.

My colleague Rupert L. Wenzel, Assistant Curator of Insects at Chicago Natural History Museum, kindly called to my attention the mollusk descriptions in Leach's obscurely titled paper.

ON THE GENUS NESONANINA C. BOETTGER

Among a few land mollusks collected at Manus Island, in the Admiralty Islands, is a shell that reminded me strongly of *Nesonanina wolfi* C. Boettger (1916, p. 288, pl. 22, fig. 6, a-c) from Maitland, New Mecklenburg (=New Ireland), with which I happen to be acquainted from the original material. The shell in question belongs doubtless to *Helix* (*Hemiplecta*) *cartereti* E. A. Smith (1884, p. 265, pl. 22, figs. 5, 5a), which was described from Wild Island, Admiralty Islands; every feature of the original diagnosis of *cartereti* is found in our Manus specimen (C.N.H.M. No. 25642), and only in the configuration of the peristome is there a slight discrepancy between Smith's specimen and ours. In the Wild Island specimen the peristome is described as not reflected or expanded, whereas

in our Manus shell it is thickened interiorly and provided with a low, tooth-like swelling at the basal margin, exactly as in *Nesonanina wolfi*; the original figure of *cartereti* shows the peristome to be blunt, not sharp, which seems to reveal a certain thickening at the edges. The absence of the tooth-like swelling of the basal margin is explainable if the type of *cartereti* was a not fully adult shell. Rensch (1931, p. 191), who had specimens of *cartereti* from Bundralis, Admiralty Islands, does not mention a basal swelling. I believe that only fully mature specimens show this character in the peristome.

In view of the otherwise complete conformity of the Manus shell to the original description of *cartereti*, I venture to place this species in the genus *Nesonanina* C. Boettger, formerly known only from New Ireland. The resemblance of *wolfi* to *cartereti* is so close that the two species, the only forms of *Nesonanina* known, should be considered as geographical races of the nominate race *cartereti*. The study of more material of the species in question might prove them identical.

The fact that *Nesonanina* was originally described from New Ireland need not deter us from referring *cartereti* to this genus. Other land shells, like *Papuina novae-georgiensis* Cox, are common to the Admiralty Islands and New Georgia in the Solomon Islands, and other Admiralty land shells have their closest relatives, species or subspecies, in New Ireland, New Britain, or the Solomon Islands.

The systematic position of *Nesonanina* is still rather uncertain. While C. Boettger (1916, p. 288) includes his new genus in the Macrochlamyidae, it is placed by Thiele (1931, p. 625) tentatively in the subfamily Trochomorphinae of the Ariophantidae. More recently, H. B. Baker (1941, p. 238) has pointed out that it may belong to the subfamily Sesarinae of the Zonitidae. The soft parts of a species of *Nesonanina* must be studied anatomically before this problematic genus can be assigned to its correct place in the system.

A NEW GENUS AND SPECIES OF GASTROPOD

Polyhyba¹ dybasi gen. et sp. nov. Figure 34, *a*, *b*.

Type (fig. 34, *a*) from the northeast coast of Saipan, in the Marianas. No. 27949 Chicago Natural History Museum. Collected January to February, 1945, by Henry S. Dybas.

Paratypes.—Figured paratype (C.N.H.M. No. 27950; fig. 34, *b*) and nine additional paratypes (No. 27951) from the same locality.

¹ πολυζ, much, νβοζ, η, hump-backed.

Diagnosis.—A minute, broadly ovate shell, characterized by its large and effuse aperture, strongly cancellate sculpture, and a row of subsutural humps on the last whorl.

Comparisons.—Despite long and detailed study, I do not find any close relatives of the shell here described with which it might

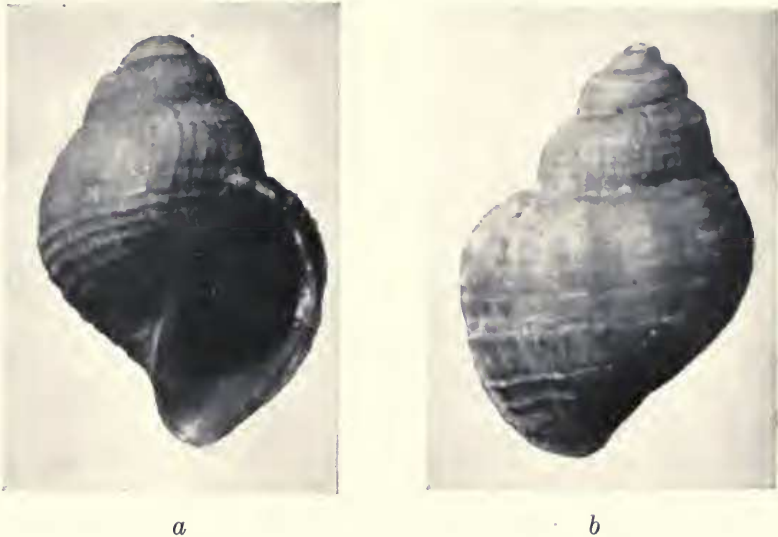


FIG. 34. *Polyhyba dybasi* gen. et sp. nov. a, C.N.H.M. No. 27949; type, $\times 25$. b, C.N.H.M. No. 27950; paratype, $\times 25$.

be compared; even the family relations cannot be satisfactorily cleared up. There seems to exist a certain similarity between *Polyhyba dybasi* and a species from the Fiji Islands, *crystallina* Garrett, which its author (1873, p. 216, pl. 2, fig. 25 [not 24, as incorrectly stated in the text on p. 216]), had tentatively classified as a *Rissoa*. Messrs. John Dyas Parker and Richard A. McLean, both of the Museum of the Academy of Natural Sciences in Philadelphia, where Garrett's types are kept, inform me, however, that the type of (?) *Rissoa crystallina* Garrett is quite different from the rather poor original illustration, and that it is not the same as, nor even closely related to our Saipan shell.

Description of the type.—Shell broadly ovate, semi-transparent, thin, grayish-brown, composed of $4\frac{1}{2}$ to 5 whorls, which increase rapidly. Nuclear whorls $1\frac{1}{2}$, apparently smooth. Postnuclear whorls slightly swollen, separated by a well-impressed suture; they show a sculpture consisting of sigmoid axial and spiral striae of about

equal strength forming cusps at their intersections. On the last whorl, the spiral striae preponderate, so that the cancellate sculpture is less conspicuous; on its lower half, some of the spiral striae look almost thread-like. Furthermore, the last whorl is characterized by a row of humps or low, broad ridges, which begin shortly under the suture, are highest at a little distance from it and gradually fade out toward the under side; they give the shell a wavy, varicose appearance, somewhat like that of *Cancellaria*. The aperture is almost two-thirds of the entire height of the shell, a little oblique, broad and conspicuously effuse at the base; the margin is thin and acute. The umbilicus is a closed rim and shows a dark purple streak; the umbilical wall is provided with some spiral striae. The operculum is unknown.

Measurements.—Height 2.1 mm., width 1.4 mm., height of aperture 1.3 mm.

Notes on the paratypes.—The one shown in figure 34, *b*, has almost exactly the same measurements as the type and agrees with it perfectly in shell characters. The remaining nine paratypes are smaller and not completely adult.

Discussion.—The shell here described as a new species of a new genus does not offer any features that clearly define its family relationships, the lack of knowledge of the operculum increasing the uncertainty; the appearance of the aperture, furthermore, suggests a not quite adult shell. The positive features, on the other hand, are sufficiently striking to warrant its description. Since a decision must be made as to its systematic position, I attribute *Polyhyba* tentatively to the rissoids, expecting from a fuller knowledge, especially from that of the operculum and the anatomy, additional features to corroborate this conclusion, or to allow a better one. I suppose our new species to be an aquatic gastropod, but cannot be sure whether it is of marine or of fluviatile habits; for, in the lot in which it was contained, there were, besides shallow water sea shells, some fresh-water species, which, after having been washed into the ocean from a nearby stream, had again been washed ashore. Hence, our shell, represented only by empty though well-preserved specimens, could be a fluviatile species and not a marine rissoid at all.

The novelty is named after my colleague at Chicago Museum, Assistant Curator of Insects Henry S. Dybas, who, besides collecting this shell, made a good representative collection of shells during his war-time stay in the Marianas.

SHELL SCULPTURE IN NORMALLY SMOOTH UNIONID SHELLS

Among the fifty shells of *Anodonta (Lastena) couperiana couperiana* Lea, collected, on May 22, 1939, in the Wakulla River, about one mile from Wakulla Springs, Wakulla County, Florida, about twenty, while otherwise entirely typical, showed more or less marked traces of shell sculpture, as shown in figure 35. Since none of the few



FIG. 35. *Anodonta (Lastena) couperiana couperiana* Lea; C.N.H.M. No. 24615a, right and left valves from outside; $\times 1$.

descriptions of *couperiana* hint that its shell may be sculptured, I was at first inclined to attribute the character of my specimens to some environmental factor absent in other localities. On looking through the Museum's additional material, among a set of six specimens of *couperiana* from the east side of Lake Okeechobee, I found a shell that is sculptured like the Wakulla River specimens, only in a less pronounced degree. Thus the sculptured form of the Wakulla River cannot be interpreted as a local phenomenon, since the development of shell sculpture can apparently take place anywhere. From this additional observation it is evident that potential sculpture of the shell exists in *Anodonta couperiana*.

The presence of a shell sculpture in species normally smooth has interested me for many years. Among the tens of thousands of palearctic unionids that I have studied, and among the vast literature on them, only six cases of sculptured specimens of otherwise smooth species have come to my attention. These cases were four species and subspecies respectively of the genus *Unio*, one of *Anodonta*, and one of *Pseudodontopsis*. These species have their beak

sculpture restricted to the very tips of the beaks. Their adventive shell sculpture is developed only on the middle and rear parts of the disk, at some distance from the umbos, and never in contact with the beak; furthermore, the disk sculpture, consisting of ridges and furrows crossing the growth-lines, is entirely different from that of the



FIG. 36. *Anodonta (Lastena) couperiana couperiana* Lea; C.N.H.M. No. 24615b, from ventral side, showing interlocking folds. $\times 2.5$.

beak. Beak and disk sculpture have, obviously, nothing to do with each other.

The cases mentioned above must not be confused with those of other unionids, which, though in most cases devoid of any shell sculpture besides the beak-sculpture, may occasionally and in certain localities present some sculpture on the shell disk. I am thinking especially of the well-known species *littoralis* of the palearctic genus *Psilunio*, and of a species of *Hyridella* from New Zealand, in which the adventive sculpture is contiguous with and obviously is an intensified beak-sculpture.

At first glimpse, the type of adventive sculpture in *Anodonta couperiana* seems to be symmetrically arranged on the two valves; but this is incorrect in the strict sense of the word "symmetry." The bivalve shell, with its sculpture, originates at the margins of the animal's mantle; in the special cases we are discussing, the disk sculpture often vanishes during the growth of the shell, so that, in the adult shell, it is at some distance from the margin, with a marginal belt, unsculptured and smooth, between the distal end of the sculp-

ture and the shell margin. If a shell in which the adventive disk sculpture still extends to the very border of the shell is closely inspected from the ventral border (fig. 36), it becomes evident that a sculpture-ridge on the right valve corresponds to a furrow on the left one, and vice versa. Otherwise, the two valves would not be able to close tightly. This feature is well known from normally sculptured shells, like scallops or many other unionids; a young *Amblema gigantea* Barnes is shown (fig. 37) for comparison. Thus "symmetry" for the closely similar sculptural patterns on the two valves of a shell is not the correct term.

No explanation of this type of adventive sculpture is evident, nor can I make any suggestions as to a possible cause. An explanation by Modell (1930) makes the gravid gills of the soft parts responsible for the origin of the disk sculpture; but this explanation is untenable, because the distal ends of the gills are always at some distance from the mantle edges, which secrete and mold the shell. The portion of the mantle lying over the gills has nothing to do with the formation of the shell. Were Modell's explanation correct, all the shells with an adventive sculpture on their disks would be females.

A closer inspection of shells in collections and in the field will doubtless add more cases of adventive disk sculpture to the few now known. A study of the possible causes of adventive sculpture may throw light upon the still unknown reasons for the development of



FIG. 37. *Amblema (Megalonaia) gigantea* Barnes; C.N.H.M. No. 9418f, from ventral side, showing interlocking folds. $\times 2.25$.

shell sculpture in general. The fact that some normally smooth shells have the potential ability to develop sculpture points to a wider distribution of this capacity.

REMARKS ON CYCLAS INCURVA GUPPY

Under the name *Cyclas incurva*, Guppy (1872, p. 21) described a small fresh-water shell from Trinidad, the status of which has remained disputed to this day. The original description is inadequate; it was published in an obscure serial and I accordingly reproduce it below:

Cyclas incurva n. sp.—Shell oval, transverse, inequilateral, regularly and distinctly concentrically striate, generally marked with irregular black dots, usually rather high posteriorly; valves rather ventricose, with a broad round carina running from the umbo towards the posterior angle; umbones prominent, rather approximate; hinge line nearly straight—length 6 mill., height 5 mill., thickness 3 mill.

This species appears to be very distinct from any hitherto described, and in form is not unlike an *Anodon*. Old specimens are nearly black, and have the umbones eroded. Compared with the only other known Trinidad species of the genus, this is much larger and thicker; it is also more oval and longer in proportion to its height, and the black markings also distinguish it from *C. punctigera*, which, according to Temple Prime, is a *Pisidium*. Of the latter shell I have lately acquired specimens identical in appearance with the type, but almost or quite destitute of the points from which the name is derived.

Cyclas incurva was found in the Chatham River at Erin, on the South Coast of Trinidad—but I have received examples of a shell without name, from M. Adolphe Schramm of Guadelupe, which I am not able to distinguish from ours.

Besides the uncertainty as to the relations of *Cyclas incurva*, there is also a discrepancy of opinions concerning the genus of sphaeriids to which this species belongs. As late as 1893, Guppy (p. 229) insisted on calling his species a *Cyclas*, emphasizing his belief that *Pisidium* should have no higher rank than that of a subgenus of *Cyclas* (= *Sphaerium*). In 1890, Crosse (p. 61) still claimed *C. incurva* to be a *Pisidium*, basing his opinion on Guppy's original statement (1872, p. 21) that the shell is inequilateral. Clessin and Prime in their respective treatises on the sphaeriid shells did not mention *C. incurva* at all, whereas E. A. Smith (1896, p. 250) lists the Guppyan species as *Sphaerium* (*Limosina*) *incurvum*. The only figure of the species of which I know was published by Sowerby (1878, pl. 4, fig. 39); it proves that Smith was correct in placing *incurva* in what is now considered to be the genus *Limosina*. Thus the generic position of *Cyclas incurva* seems to be established.

The species of *Limosina* from the West Indies are all rather closely related and perhaps not more than geographical races of a single species. Among them *Limosina modioliformis* Anton from Venezuela seems to be the nearest relative of *incurva*. It is quite possible that the two are identical. *Pisidium moquiniatum* Bourguignat

I consider to be a synonym of *modioliformis*. The island of Trinidad lies sufficiently close to the South American mainland and its isolation is sufficiently recent to make such a range plausible.

Chicago Natural History Museum has recently received a specimen of *Limosina incurva* (No. 28314) collected during the Trinidad Zoological Expedition of 1946-47 at Brickfield, five miles south of Tambaquite, on March 9, 1947, by Mr. Frank Wonder. It was discovered in the Museum in cleaning a specimen of *Ampullaria glauca effusa* Müller from the locality named; the specimen of *Limosina incurva* was in the umbilicus of the *Ampullaria*. Prime (1865, p. 54), writing of *L. modioliformis*, makes the statement that a certain specimen of that species had been found "in a large *Ampullaria* from Brazil." There being only two known instances, it is as yet impossible to connect the presence of *Limosina* from South America on ampullariid shells, with the well-known fact that certain other species of the genus, especially the African *Limosina parasitica*, live on fresh-water clams, attached by means of the byssus; but it is by no means impossible that the identical habit of life has led to the otherwise unexplainable association of certain species of *Limosina* with *Ampullaria*.

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